

## TECHNICAL MEMORANDUM

**PREPARED FOR:** StarKist Samoa, Inc. (NPDES Permit AS0000019)

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**DATE:** 31 December 1999

**SUBJECT:** Chemical Analysis of Effluent:  
November 1998 Sampling

**PROJECT:** 147323.JC.EM

### ***Purpose***

This memorandum presents the results of the chemical analyses of StarKist Samoa effluent samples that were collected in November 1998. This was the twelfth sampling and analysis episode conducted under the current NPDES permit.

### ***Study Objectives***

Section D.2 of StarKist Samoa's NPDES permit (AS0000019) requires that semiannual priority pollutant analyses be conducted on the cannery effluent. Each effluent sampling event must coincide with effluent sampling for acute biomonitoring. Effluent samples are collected as composite samples as described below. The purpose of these analyses is to identify the chemicals present in the effluent, and provide data to determine whether the wastewater discharge complies with water quality standards.

Effluent priority pollutant analyses include those chemical constituents listed in 40 CFR 401.15. As documented in the Technical Memorandum describing the results of the March 1995 sampling (CH2M HILL, 20 June 1995) the U.S. Environmental Protection Agency Region 9 has allowed StarKist Samoa to exclude a number of previously measured constituents in the priority pollutant list. The constituents currently included in the effluent chemistry analyses are listed in Table 1.

### ***Methods***

Between 1200 on 19 November and 0900 on 20 November 1998, a 24-hour, flow-weighted composite sample of final effluent was collected from the StarKist Samoa treatment plant discharge. Effluent composite samples were collected simultaneously for chemistry and bioassay analyses. Table 1 lists the chemical analyses, detection limits, sample holding times, sample containers, and sample preservations for the effluent sample collected for chemical analysis. The standard operating procedures (SOP) for the joint cannery outfall chemistry sampling is provided in the Technical Memorandum describing the bioassay tests conducted with the March 1995 effluent

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sample (CH2M HILL, 20 June 1995).

Samples were collected from the established effluent sampling site following the established composite sample collection schedule for the priority pollutant analyses. A total of eight individual grab samples were collected into pre-cleaned glass containers at approximately three-hour intervals over a 24 hour period. The samples were stored on ice until the completion of the 24-hour sampling period, and then a flow-weighted composite sample was prepared. The grab sample collection times and the calculated individual volumes of each grab sample used to create the composite sample, based on StarKist Samoa's flow records, are summarized in Table 2. The final composite sample was used to fill the sample containers sent to the laboratory for analyses. The pH of the samples for analysis of metals and total phenols was measured prior to shipping and was less than 2.0 SU. A duplicate sample was taken and shipped without preservative for copper analysis using co-precipitation.

Sample containers were wrapped in bubble-wrap, placed in zip-lock bags, and packed on ice for shipment to the laboratory. Sample chain of custody forms were completed, sealed into zip-lock bags, and taped inside the lid of the ice chest. Samples were shipped to the laboratory via DHL. Samples that were composited on 20 November, were received at Analytical Resources, Incorporated (ARI) 23 November 1998.

## ***Results***

Laboratory data sets, laboratory quality control data reports, and chain-of-custody form are attached to this memorandum. The chain-of-custody form is included as Attachment I and the laboratory analytical data sheets and quality control data reports are included as Attachment II. Table 1 indicates the detection limits requested from the analytical laboratory along with those achieved during the analysis. The laboratory indicated, prior to sample analysis, that the requested detection limits could be achieved. Detection limits were achieved for all semivolatile organics and all inorganics. In order to achieve requested detection limit, copper was analyzed using method EPA 200.7, following extraction by co-precipitation.

Semivolatile organics were all at the non-detect level with the exception of phenol, 4-methylphenol, and bis (2-Ethylhexyl) phthalate. Bis (2-Ethylhexyl) phthalate was detected at 31 µg/l. Phenol and 4-methylphenol are compared with past sample results in Table 3. Total recoverable phenols were detected at 180 µg/l.

The inorganics analyses detected three chemical parameters in the effluent from StarKist Samoa. Mercury was detected at the reported detection limit (0.0001 mg/l). Arsenic and zinc were detected at comparable levels with those previously reported. Table 3 summarizes the sample results for substances detected for the November 1998 effluent sample analysis compared to those detected during previous analyses.

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| <b>Table 1<br/>Effluent Sample Analyses and Handling Procedures<br/>StarKist Samoa, 19 - 20 November 1998</b>   |                             |                        |                 |                     |                     |  |
|---|-----------------------------|------------------------|-----------------|---------------------|---------------------|--|
| Chemical Parameter  | Analytical Method Requested | Detection Limits, µg/l |                 | Sample Holding Time | Sample Container    | Sample Preservation                                      |
|   |                             | Requested              | Achieved        |                     |                     |  |
| Semivolatile Organics   | EPA 625                     | 10-50                  | 20-200          | 7 days              | 1 liter amber glass | 4 °C   |
| Phenols   | EPA 420.1                   | 10                     | 40              | 28 days             | 500 ml plastic      | 4 °C<br>5 ml H <sub>2</sub> SO <sub>4</sub> <sup>1</sup> |
| Inorganics <sup>2</sup>   |                             |                        |                 |                     |                     |  |
| Arsenic   | EPA 206.2                   | 5                      | 2               | 6 months            | 500 ml plastic      | 4 °C, 5 ml 2N HNO <sub>3</sub> <sup>1</sup>              |
| Cadmium   | EPA 200.7                   | 5                      | 10              | "                   | "                   | "  |
| Chromium  | EPA 200.7                   | 10                     | 20              | "                   | "                   | "  |
| Copper  | EPA 220.2                   | 2                      | 10 <sup>3</sup> | "                   | "                   | "  |
| Lead  | EPA 239.2                   | 5                      | 1               | "                   | "                   | "  |
| Mercury   | EPA 245.1                   | 0.4                    | 0.1             | "                   | "                   | "  |
| Selenium  | EPA 270.1                   | 5                      | 5               | "                   | "                   | "  |
| Silver  | EPA 272.2                   | 2                      | 0.2             | "                   | "                   | "  |
| Zinc  | EPA 200.7                   | 20                     | 20              | "                   | "                   | "  |
| <sup>1</sup> Additional HNO <sub>3</sub> and H <sub>2</sub> SO <sub>4</sub> was added to the sample as necessary to bring pH equal to or less than 2 at the time of composting the sample.<br><sup>2</sup> All Inorganics were from one 500 ml plastic sample container, preserved with 5 ml 2N HNO <sub>3</sub> , with pH of filled sample bottle measured at 1.65. An un-preserved duplicate sample was taken for Copper analysis using co-precipitation.<br><sup>3</sup> Method EPA 200.7 used to achieve this detection limit following extraction by co-precipitation. |                             |                        |                 |                     |                     |  |

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| <b>Table 2</b><br><b>Effluent Chemistry 24-hour Composite Sample Collection</b><br><b>StarKist Samoa, 19 - 20 November 1998</b> |                   |                   |   |                          |                          |        |
|---|-------------------|-------------------|---|--------------------------|--------------------------|--------|
| Grab<br>Sample<br>Number  | Samplin<br>g Time | Samplin<br>g Date | Effluent<br>Flow Rate<br>(mgd) <sup>1</sup> | Percent of<br>Total Flow | Volume of<br>Sample (ml) |        |
|   |                   |                   |   |                          | 1 liter                  | 500 ml |
| 1   | 1200              | 11/19/98          | 1.82  | 14.7                     | 147                      | 74     |
| 2   | 1500              | 11/19/98          | 1.65  | 13.3                     | 133                      | 67     |
| 3   | 1800              | 11/19/98          | 1.29  | 10.4                     | 10.4                     | 52     |
| 4   | 2100              | 11/19/98          | 1.47  | 11.8                     | 118                      | 59     |
| 5   | 2400              | 11/19/98          | 1.46  | 11.8                     | 118                      | 59     |
| 6   | 0300              | 11/20/98          | 1.50  | 12.1                     | 121                      | 61     |
| 7   | 0600              | 11/20/98          | 1.61  | 13.0                     | 130                      | 65     |
| 8   | 0900              | 11/20/98          | 1.59  | 12.8                     | 128                      | 64     |
| TOTALS  |                   |                   | 12.39                                       | 99.9                     | 999                      | 501    |
| <sup>1</sup> Mean Effluent Flow Rate = 1.548 mgd.   |                   |                   |   |                          |                          |        |

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**Table 3  
Summary of StarKist Samoa Effluent Chemistry Sample Results  
February 1993 - November 1998**

| Substance                    | Previous Sample Results, µg/L (ppb) |                          |                 |                 |                 |                 |                 |             |             |             | Nov 1998<br>Sample Results,<br>µg/L (ppb) |                  |
|------------------------------|-------------------------------------|--------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------|-------------|-------------|---|------------------|
|                              | Feb<br>1993                         | Oct<br>1993 <sup>1</sup> | Feb<br>1994     | Oct<br>1994     | Mar<br>1995     | Feb<br>1996     | Mar<br>1996     | Nov<br>1996 | Mar<br>1997 | Sep<br>1997 | Jun<br>1997                               |                  |
| <b>Inorganics</b>            |                                     |                          |                 |                 |                 |                 |                 |             |             |             |   |                  |
| Arsenic                      | 6.0                                 | ND (14)                  | ND              | 9               | ND <sup>2</sup> | ND              | ND <sup>3</sup> | 10          | 15          | 12          | 20  | 23               |
| Cadmium                      | ND                                  | ND                       | 10              | ND              | ND              | ND              | ND              | ND          | ND          | ND          | ND  | ND               |
| Copper                       | ND                                  | (ND)                     | 15              | ND              | 6               | 13              | ND <sup>4</sup> | 5           | 4.7         | 4           | ND  | ND               |
| Mercury                      | ND                                  | ND                       | ND              | ND              | ND              | ND              | ND              | ND          | ND          | ND          | ND  | 0.1 <sup>8</sup> |
| Selenium                     | ND                                  | ND                       | ND <sup>5</sup> | ND <sup>5</sup> | ND <sup>5</sup> | ND <sup>6</sup> | ND <sup>6</sup> | 15          | ND          | 10          | ND <sup>7</sup>                           | ND               |
| Silver                       | 130                                 | 33 (39)                  | ND              | ND              | ND              | ND              | ND              | ND          | ND          | ND          | ND  | ND               |
| Zinc                         | 92                                  | 130 (180)                | 140             | 84              | 120             | 63              | 81              | 117         | 150         | 154         | 198                                       | 360              |
| <b>Semivolatile Organics</b> |                                     |                          |                 |                 |                 |                 |                 |             |             |             |   |                  |
| Bis (2-Ethylhexyl) phthalate | ND                                  | ND                       | ND              | ND              | ND              | ND              | ND              | ND          | ND          | ND          | ND  | 31               |
| Phenol                       | 500                                 | 430                      | 45              | 140             | 32              | 32              | 320             | 500         | 270         | 630         | 750                                       | 220              |
| 4-Methylphenol               | 260                                 | 530                      | 360             | 290             | 310             | 130             | 370             | 490         | 310         | 240         | 500                                       | 680              |
| Total Recoverable Phenols    | NA                                  | 1300                     | 120             | 15              | 34              | 72              | 510             | 440         | 290         | 140         | 660                                       | 180              |

ND = Not Detected NA = Not Analyzed

<sup>1</sup> Values in parentheses are results of reanalyzed samples (see Technical Memorandum for October 1993 sampling episode).

<sup>2</sup> Detection limit raised to 50 µg/l because of matrix interference.

<sup>3</sup> Detection limit raised to 400 µg/l because of matrix interference, with the resultant concentration <400 µg/l each time.

<sup>4</sup> Detection limit raised to 25 µg/l because of matrix interference, with the resultant concentration <25 µg/l.

<sup>5</sup> Detection limit raised to 50 µg/l because of matrix interference, with the resultant concentration <50 µg/l each time.

<sup>6</sup> Detection limit raised to 200 µg/l because of matrix interference, with the resultant concentration <200 µg/l.

<sup>7</sup> Detection limit raised to 10 µg/l because of matrix interference, with the resultant concentration <10 µg/l.

<sup>8</sup> Detection Limit = 0.1 µg/l for mercury.

**ATTACHMENT I**

**CHAIN-OF-CUSTODY FORMS**

**StarKist Samoa, Inc. Effluent Sample**

**19 - 20 November 1998**

**ATTACHMENT II**

**LABORATORY DATA REPORT  
Analytical Resources, Inc.**

**StarKist Samoa, Inc. Effluent Sample**

**19 - 20 November 1998**